concurrence of the Minister of Finance, Stas resolutely resisted a scheme he considered dangerous to the interests of the nation. With a change of Ministry the proposed measure was carried. Stas forthwith resigned his post in the Mint, preferring to sacrifice emolument rather than countenance a step which he knew to be detrimental.

Stas not unfrequently engaged in tasks which appeal more directly to the popular mind than the determination of atomic weights. In 1850, Belgium was thrown into excitement by a poisoning case not less sensational than that of Palmer in our own country. It has been said of Belgium that it is less permissible to knock down an *ouvrier* than to murder a nobleman. A Count Bocarme had poisoned his brother-in-law. Had the crime in question been committed by one of the *people*, it might, if not condoned, have been inquired into in a somewhat perfunctory manner. But as the only man to whom suspicion pointed was an aristocrat, a searching investigation was demanded by an indignant public. The chemical investigation conducted by Stas was performed in a masterly manner. The unerring chemist not only detected nicotine poison, but also the exact quantity which had been administered. The guilt of Count Bocarme was much more satisfactorily established than that of Palmer in the Rugeley case.

With characteristic thoroughness Stas was not satisfied with the mere detection and quantitative determination of nicotine. He elaborated a general method for the recognition of organic poisons in chemico-legal investigations. His method of detection, revised and perfected by Julius Otto, is still in general use among toxicologists, under the name of the Stas-Otto process.

At the London International Exhibition of 1862, to Stas was intrusted the report on the industry of oils and fats. The question was discussed whether the old method of saponification by means of alkalies or the recently invented acid saponification was to be preferred. The experiments of Stas demonstrated not only the superiority of the acid process from an economical point of view, but supplied the industrial world with the working details of a method still followed by the manufacturers of stearine candles.

At the initial meeting of the International Committee of Weights and Measures held at Paris in 1875, Stas appeared as the Belgian representative, and took a very active part in its labours. From 1877 to 1879 he was associated partly with H. Ste. Claire Deville, and partly with C. J. Broch in the selection of the metals to be used as standards or prototypes for weights and measures. The alloy selected consisted of 90 per cent. of platinum, and 10 per cent. of iridium. The reports are rich in important observations on the properties of the platinum metals. Unfortunately they have been published, so far as the writer is aware, only in the *Procès-Verbaux du Comité International des Poids et Mesures*, documents not readily accessible. The results have still to find their way into the text-books and metallurgical manuals.

But other labours of the illustrious Belgian chemist have still to be unearthed. At the request of his Government he carried out important researches on metallic alloys for the manufacture of heavy artillery. His copious reports are said to be buried in the archives of the Belgian War Department.

In one quarter only did Stas encounter ill will. He was a champion of the freedom of research and of the independence of the Universities. Hence he came into frequent collision with the "clerical party," which in Belgium plays a *rôle* similar to that of the ethicists and self-constituted "anti-" Societies in Britain.

On January 1, 1891, at the King's New Year reception he courageously reminded the Ministry of the respect which a Government owes to science. We regret we have not met with the text of this discourse, which would be worth reproduction in England. The insulting replies to the bold utterance of Stas were drowned in the loud and general approval of the country.

It is pleasant to add that the personal character of Stas was in harmony with his scientific pre-eminence. He was a man of whom it could be said, "Nihil tetigit quod non ornavit." It was one of his great distinctions that, unlike many illustrious men of science, he was not followed to the grave by the ghosts of dead theories.

## *NOTES.*

MEN of science were glad to see that the list of those on whom birthday honours were conferred included Dr. John Evans, who has become a K.C.B.; Mr. W. T. Thiselton Dyer, who has been made a C.I.E.; and Mr. H. H. Howorth, who has been made a K.C.I.E.

THE annual visitation of the Royal Observatory at Greenwich will take place on Saturday, June 4.

THE Secretary of the British Association Committee for arranging for the occupation of a table at the laboratory of the Marine Biological Association, at Plymouth, requests us to announce that applications for the use of the table during the present summer should be addressed to him (Mr. S. F. Harmer, King's College, Cambridge) not later than Friday, June 10.

MR. WALTER GARSTANG, M.A., Berkeley Fellow of the Owens College, Manchester, and formerly assistant to the Director of the Marine Biological Association, has been appointed to a naturalist's post upon the staff of the Marine Biological Association at Plymouth, and will have charge of the dredging and collecting operations conducted at the station.

IN the fifth Annual Report of the Liverpool Marine Biology Committee (December 1891), Prof. Herdman suggested that the marine biological station might with advantage be changed from Puffin Island to some more easily accessible part of the district, where a fresh area could be investigated. After a careful consideration of several sites, the Committee decided upon Port Erin, at the south end of the Isle of Man, and a suitable building for a marine laboratory, of three rooms, has now been erected, on the beach immediately below the Bellevue Hotel, from plans prepared by Prof. Herdman. This laboratory being ready for workers, and a number of members of the Liverpool Biological and other scientific societies, and also of the Isle of Man Natural History and Antiquarian Society, having expressed an interest in the progress of the undertaking, the Committee have resolved to inaugurate the station by a formal opening on Saturday, June 4. The Lieutenant-Governor of the Island, Mr. Spencer Walpole, has consented to perform the ceremony; and His Excellency, and the Bishop of Sodor and Man, have accepted the invitation of the Committee to be present at a luncheon to be given at the Bellevue Hotel on the occasion.

THE Puffin Island Biological Station has been taken over by several members of the staff of the University College of North Wales, Bangor, and will be worked henceforth in connection with that College. Dr. Philip White, the lecturer on zoology, has been appointed director of the station. The island is in full view of, and within easy reach of, the College. The station, as formerly, will be entirely supported by voluntary contributions.

THE Marine Biological Laboratory at Wood's Holl, Massachusetts, will be open for investigators from June 1 to August 30. The demand for tables at the laboratory has been so great that the trustees decided some time ago to enlarge the building, and a spacious new wing will be ready for use on July 1. Various courses of instruction in zoology, botany, and microscopical technique will be given, as usual, during the season. Lectures on special subjects will also be delivered by members of the staff.

THE annual *conversazione* of the Society of Arts will take place at the South Kensington Museum on Wednesday evening, June 29.

THE German Anthropological Society will hold its general meeting this year at Ulm, beginning work on July 31. Arrangements have been made for some very pleasant excursions in the neighbourhood.

MAJOR-GENERAL NOBLE, R.A., died on Tuesday, May 17, in his fifty-eighth year. He was well known, not only as the author of books on military subjects, but as the inventor of various scientific instruments connected with the manufacture of guns and gunpowder.

THE University of Heidelberg has conferred the degree of Doctor of Natural Philosophy, *honoris causâ*, on the well-known entomologist, Baron Osten Sacken.

THE beautiful illustrations contained in the *Black and White* Hand-book to the Royal Academy and New Gallery pictures are sure to be welcomed by those who have not already seen them, while to those who have visited these Galleries good reproductions of them will not be amiss. The different coloured tints given to the pictures produce a pleasant variety of impression, while the fidelity to the original details, which is the chief feature of photographic processes, is here thoroughly maintained. Not only the pictures, but the specimens of sculpture, are reproduced in the same way, the results being equally successful. As an introduction to the volume, a brief but interesting account is given of the Royal Academy, together with illustrated biographies of the present Academicians and Associates.

PART I. of Mr. G. J. Romanes's treatise, "Darwin and after Darwin," was published a day or two ago by Messrs. Longmans, Green, and Co. It deals in a critical manner with the distinctively Darwinian theory, or the evidences of evolution as a fact, and of natural selection (with sexual selection) as a method. It is copiously illustrated, for the most part with original woodcuts, and runs to 450 pages. We gather from the preface that Part II. is to treat in a similar spirit of "Post-Darwinian Theories" (heredity, utility, isolation, physiological selection, &c.); and understand that it will probably be ready for publication in the autumn season.

ON April 29, Mauritius was visited by the most terrible hurricane that is known to have ever devastated the island. According to the official telegram from the Acting Governor to the Secretary of State for the Colonies, one-third of Port Louis was destroyed. The Royal College, twenty-four churches and chapels, and many sugar-mills in the country were completely wrecked. There were over 600 deaths in Port Louis; over 300 deaths in the country and over 1000 wounded. "In Port Louis district," the telegram continued, "returns incomplete; probably same amount. No loss among the military. Estimated reduction of crop one-half. Destruction to property enormous. No famine apprehended. All relief measures taken. Relief committee appointed. Panic allayed. Order and quiet reign, but, in presence of thousands of homeless people, pecuniary assistance urgently needed." A public subscription in aid of the sufferers was at once opened by the Lord Mayor. It is to be hoped that the Observatory at Mauritius has been spared. It was thence that Dr. Meldrum announced that at Mauritius the hurricanes and wrecks varied with the sun-spots. We have again a maximum of sun-spots and unprecedented devastation.

THE National Home Reading Society will hold two summer assemblies this year, one at Weston-super-Mare, the other at Bowness. The former will last from June 25 to July 2, the latter from June 27 to July 2. At both meetings science will be well represented among the subjects of study. At Weston-super-Mare, Prof. Lloyd Morgan will lecture on "The Physical History of the Mendip Hills," Sir Robert Ball on "How came the Great Ice Age?", Dr. Dallinger on "Ants: a Study of Sociology and Politics among Insects," Dr. C. W. Kimmins on "Flowers and their Insect Visitors," Mr. A. W. Clayden on "Geological Structure and the Formation of Scenery." At Bowness, Mr. J. E. Marr and Mr. G. Massee will give geological and botanical lectures, but the chief work of the classes in geology and botany will be done in the course of excursions to the places of scientific interest in the Lake District. Both assemblies are likely to be of great service to all who attend them.

MR. GEORGE FORBES arrived on May 6 at the Niagara Falls in company with the executive officers of the Cataract Construction Company. He is acting as the Company's adviser in connection with the plans he submitted to them in 1890 for the transmission of electrical power from the Falls to Buffalo. When the Company appointed a commission of Sir William Thomson, Mascart, Colonel Turrettini, and others to examine the plans, Mr. Forbes gave them as his mature opinion the assurance that they must use alternating currents, and for motors either the ordinary alternator, as first used by Wilde, or the rotating field (Drehstrom), as then used by Tesla, which Mr. Forbes had tested at Pittsburg. These alternating currents to be used with transformers for lighting, and coupled to motors as described for general power, but for electric tramways and some other purposes the alternating motors were to drive continuous current dynamos. These plans were not approved by the commission, and a resolution was nearly passed saying that alternating currents could not be used for the purpose. There was only one dissentient voice, but in the end no resolution was passed. Turrettini and Mascart are now both converted, and Mr. Forbes's plans have been adopted.

MUCH interest has been excited in Philadelphia by a loan collection of objects used in worship, exhibited in the Museum of Archæology of the University of Pennsylvania. Most of the leading religions of the world are represented in the collection. The objects are arranged in accordance with the plan adopted at the Guimet Museum, Paris, and the managers have tried to make up for gaps by notes in the catalogue, which is a closely printed octavo of 174 pages. One result of the exhibition has been that it has brought to light many objects of scientific importance, the significance and value of which were not formerly known by the possessors.

MR. JOHN H. COOKE has made a valuable addition to the Museum of the Malta University. The *Mediterranean Naturalist* describes the gift as a suite of the Maltese fossil Echinoidea, similar to those that have lately been presented by the same gentleman to the British Museum and to the University of Bologna.

A WRITER in the May number of the *Mediterranean Naturalist*, speaking of the colours of the waters of the Mediterranean, says they vary considerably at different seasons of the year and in different localities. During storms and boisterous weather the sea assumes a deep green and sometimes a brownish tint, but when calm and undisturbed it is of a bright, deep blue. In the Bosphorus, and among the islands of the Archipelago, the water is of varying tints, in some places being of a liquid blue graduating into a brighter green, and in others assuming a blue so deep in its intensity as to almost approach a purple.

MR. K. SEKIYA AND MR. F. OMORI contribute to the new volume of the Transactions of the Seismological Society of Japan a most careful paper presenting a comparison of earthquake measurements made in a pit and on the surface ground. It is generally thought that the earthquake motion is considerably less in a pit than on the surface. The conclusion of these inquirers is that for small earthquakes there is no practical difference between the surface and underground observations. For the principal undulations of severe earthquakes a difference may exist, but not to any marked degree; but for small quick vibrations the difference is considerable. Though the calculation for the ripples may be only approximate, their maximum velocities and maximum accelerations are found to be very great, and, in fact, many times greater than those for the principal undulations. Thus, if these ripples are really in great part smoothed away in the pit, it is very likely that in the case of very severe earthquakes there might be less destructive action in deep pits than on the free surface.

THE weather during the past week has been less settled generally than for some time past, although for the most part it was fine and dry over the south and east of England. The distribution of atmospheric pressure was favourable to a westerly type of wind, the barometer being highest over the south of our islands, and lowest over Scotland. An anticyclone was situated over France and Spain throughout the period, and the southern portion of England came greatly under its influence. Several depressions reached the northern parts of the kingdom from the Atlantic, and caused strong winds and gales at some places. The rainfall was considerable in the north and west, amounting to one inch at Stornoway on Monday, but slight in other parts. Bright sunshine was less prevalent; the Meteorological Office report for the week ended the 21st shows that it was below the average in all districts except the Channel Islands. A thick fog occurred over the south of England and parts of the Channel on Sunday. Temperatures have been rather high recently, the maxima reaching 70° and upwards, in places, since Sunday.

THE Weather Bureau of Washington, U.S., has issued, under the title of "Meteorological Work for Agricultural Institutions," a pamphlet containing suggestions as to observations and investigations regarding the relations of climate to agriculture which may with advantage be undertaken at stations situated in agricultural districts, as distinct from the work carried on at observatories and stations established in towns. These suggestions are equally useful for observers in any country; we therefore draw attention to some of the points referred to. (1) Problems of temperature; such as the differences that occur in quiescent air, between places that are close together. These differences depend on solar and terrestrial radiation, the covering of the soil, &c. The subject of protection from frosts also deserves further study. (2) Moisture in the air; especially measurements of evaporation, both from a water surface and from different kinds of soil. The transpiration of plants should also be measured, in such a way that the evaporation from a plant can be compared with the precipitation over the surface occupied by the plant. (3) Condensation and precipitation of moisture. An accurate record of the amount of dew is much wanted; at present, no observations are regularly made. A drosometer has, however, been recently constructed by Kappeller, of Vienna; it is described in the *Meteorologische Zeitschrift* of March last, and is said to give good results. Snow presents many features of interest, such as its density, and the relation of the character of the flake to the character of the weather at the time of the fall. The density of fog, also, should be recorded on some uniform plan, such as the distance at which a slender pole can be seen. The average size and usual forms of hail-stones should also be recorded. (4) Local weather predictions, independent of the daily weather charts, should be carefully studied. The special study of thunderstorms and other local disturbances will result in enabling them to be predicted several hours in advance. Systematic observation with the rain-band spectroscope should also be made. These are but a few of the questions raised in Prof. Harrington's interesting memoir.

WE have received from the Director of the Batavia Observatory (1) rainfall observations in the East Indian Archipelago, and (2) observations made at the Magnetical and Meteorological Observatory, Batavia, both for the year 1890. The daily and monthly rainfall values are given for 193 stations, together with the mean values, calculated from five or more years for 171 stations. The summaries show that the rainfall which accompanied the eastern monsoon was copious over the whole area, and that both in the years 1889 and 1890 he amount during the months of May to September was abnormally high in the eastern parts of the archipelago. In addition to the hourly meteorological observations for 1890, results for twenty-five years, 1866-90, are published in this volume. Dr. Van der Stok considers the fact proved beyond doubt that at Batavia the moon has an appreciable influence on the number of thunderstorms. The cloud curve also shows an increase of cloudiness as the moon rises above the horizon. After the moon has set, the cloudiness does not decrease at a continuous rate, but apparently remains constant.

WE have received the January number of the *Revista do Observatorio*, which is a monthly publication of the Observatory of Rio de Janeiro. This pamphlet, which, by the way, is an index number, contains in tabulated form all the meteorological observations made during that month at the several places from which regular observations can be obtained. The tables show the daily as well as the hourly reduced readings.

THE Technological Museum of Sydney was taken over by th Department of Public Instruction on January 1, 1890. In his first annual report, just received, Mr. J. H. Maiden, the Curator, says the public have shown their appreciation of the usefulness of the Museum by presenting it with a large number of objects, many of which are of great value. The authorities of the Museum have done excellent service by supplying lecturers with specimens, diagrams, and apparatus for illustrative purposes, and by answering questions sent to them by public school teachers—chiefly in country districts—on such matters as the naming of minerals and plants. Technological museums have been, or are being, formed in all those towns in New South Wales which already possess technical colleges. Mr. Maiden says that the matter has been taken up warmly in country districts, and that the formation of local collections is felt to fill up an important gap in the arrangements for technical education in the colony. A flourishing scientific society at West Maitland offered its valuable collection of natural history specimens to the Department of Public Instruction on condition that suitable accommodation should be found for them, and facilities given to the members for access to them. The specimens having been accepted by the Minister on these terms, they form a valuable addition to the West Maitland Technological Museum, constituting a natural history "side" to it. As local scientific societies are always likely to be useful in securing specimens for local museums, and in concentrating the scientific activity of a district to the advantage of the local technical college, and of the district in general, Messrs. Sach and Ross, the resident science masters at Goulburn and Bathurst respectively, have formed scientific societies in their respective cities. These societies have already a good number of members, who meet regularly for the discussion of scientific questions, and they seem to Mr. Maiden to give promise of much usefulness.

AT the meeting of the Linnean Society of New South Wales on March 30, Mr. R. Etheridge, Jun., read a paper on, and exhibited, a very peculiar form of "womerah." It is from an unknown locality, but its history is partially known, and a clue is furnished by three very similar weapons in the Macleay Collection from Port Darwin. It is lath-like in form, slightly curved in outline, and altogether a remarkable implement, very unlike anything, to the author's knowledge, previously described.

DR. G. T. STEVENS publishes in *Science* of May 6 an interesting preliminary note on the relations of the motor muscles of the eyes to certain facial expressions. He has for some years closely observed the anomalies of the muscles which govern the movements of the eyes, and has been struck by the fact that remarkable changes often follow the modification of the conditions of these muscles. This led him not only to regard such facial changes with greater care, but to bring to the subject the aid of photography, by means of which alone the expressions could be accurately registered. Photographic portraits giving a direct front view of more than two thousand persons have thus been made. In each case a record, as full as he has been able to obtain, of the state of the eye muscles has been made, and in the majority of cases careful observations have been repeated many times during some weeks or months. Photographs have been taken at various stages of modification of these muscles, so that a comparative study of the face under varying conditions of the eye muscles has been rendered possible. The result of the investigation has been to demonstrate that "certain well-defined types of facial expression are not only associated with, but are dependent upon, certain relative tensions of the oculo-motor muscles." The object of his paper is to present the general characteristics of some of the most typical forms of expression which have their origin in efforts to adjust the eyes.

THE first part of a paper on the development of American armour-plate, by Mr. F. Lynwood Garrison, appears in the May number of the Journal of the Franklin Institute. It was the author's original intention to present in the form of a report the results of the recent armour-plate trials at Indian Head. As, however, these trials have been described in an excellent report by the Chief of the Bureau of Ordance of the U.S. Navy, Mr. Garrison has preferred to give a sketch of the development of armour-plate, combining with this the more important details of the official report. He writes from the standpoint of the metallurgist rather than that of the military engineer. At present great interest is centred upon the use of the complex steel alloys and the methods adopted to harden them, and it is to these subjects more particularly that he calls attention. The detailed methods of producing such alloys as well as the several methods for quenching and tempering armour-plate are kept secret by steel manufacturers; but the results are made public at the trials, and "the possible deductions to be made therefrom," says Mr. Garrison, "are patent to every observing and thinking engineer." The fact that he has had exceptionally good opportunities of making such observations is a sufficient reason for the publication of his views.

SOME interesting details as to the production of mercury in Russia have been submitted by Prof. Emile Muller, of Taschkent, to the Paris Geographical Society. A bed of this rare metal, discovered at Ekaterinoslav, is now worked with great energy, and 20,000 pouds (320,000 kilogrammes) of pure mercury are obtained. The entire demand for the metal in Russia is supplied from this source, and a surplus of 14,000 pouds (224,000 kilogrammes) is exported. During the past year mercury was discovered in the district of Daghestan, in the Caucasus, and it is expected that the discovery will lead to the growth of a profitable industry in that region.

THE vine industry in Bashahr, in the Punjab, was formerly of great importance; but of late years it has declined in consequence of the old trees having been attacked by a disease. Mr. Coldstream, the Deputy Commissioner of Simla, proposes to revive the industry, if possible, and has secured a large number of cuttings for the State.

THE *Pioneer Mail* (Allahabad) of May 5 says that locust swarms are reported from the frontier, and that stragglers have been observed again passing over Lahore. It is thought that they have chosen a bad time, as the district is full of the migratory hosts of starlings which come at this season of the year to feed upon wild mulberries, and few of the stragglers are likely to "run the gauntlet" successfully.

THE additions to the Zoological Society's Gardens during the past week include a Bonnet Monkey (*Macacus sinicus* ♀) from India, presented by Mr. M. McPherson; a Crested Porcupine (*Hystrix cristatus*) from Africa, presented by Mr. J. Bullock; a Common Pea-fowl (*Pavo cristatus*) from India, presented by Colonel Bagot Chester; two Yellow-bellied Toads (*Bombinator bombinus*), European, presented by Mr. A. M. Ansler; two Black Bears (*Ursus americanus*) from North America, deposited; a Japanese Deer (*Cervus sika* ♂); a Bennett's Wallaby (*Halmaturus bennetti* ♀); two Himalayan Monauls (*Lophophorus impeyanus*); two Greater Black-backed Gulls (*Larus marinus*), bred in the Gardens.

## *OUR ASTRONOMICAL COLUMN.*

PARIS OBSERVATORY REPORT.—The annual report on the state of the Paris Observatory for the year 1891, presented by Admiral Mouchez, shows that a considerable amount of work, as in former years, has been accomplished during the past year. After mentioning briefly some of the last reports that have been communicated by those who are undertaking the work of photographically charting the heavens, he gives a *résumé* of the resolutions that have been adopted during the session of 1891. In the table showing the zones allotted to the different Observatories, that given to Greenwich lies between declinations + 90° and + 65°, and that to Oxford between + 31° and + 25°; the number of plates for each zone being 1149 and 1180 respectively. A *résumé* of the meridional observations for the year informs us that no less than 19,458 observations were made, while those of the planets amounted to 570. M. Paul Henry, M. Wolf, and M. Deslandres, have all been busily engaged in their respective sections, their work having been previously mentioned in these columns. The second volume of the catalogue and the second volume of the observed positions (6h. to 12h.) have been completed and published; while Part III. (12h. to 18h.) is still in preparation. The observations for 1884 are now quite finished, and those for 1885 will be ready by the end of this year. The verification of the reduction of the observations made in 1884–86 for the formation of a catalogue of twenty-four stars very near the Pole has already been commenced, and should, when completed, form a most important volume. The individual works that have been published from time to time are also referred to here. The meteorological observations and time service have been continued as usual.

STARS WITH REMARKABLE SPECTRA.—No. 3090 of the *Astronomische Nachrichten* contains a list of stars with remarkable spectra, continued from a former number (3023) of the same periodical, and communicated by T. E. Espin. The num-